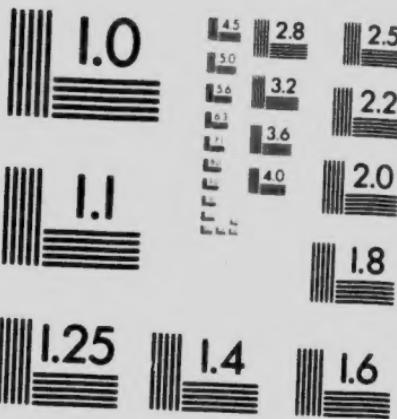


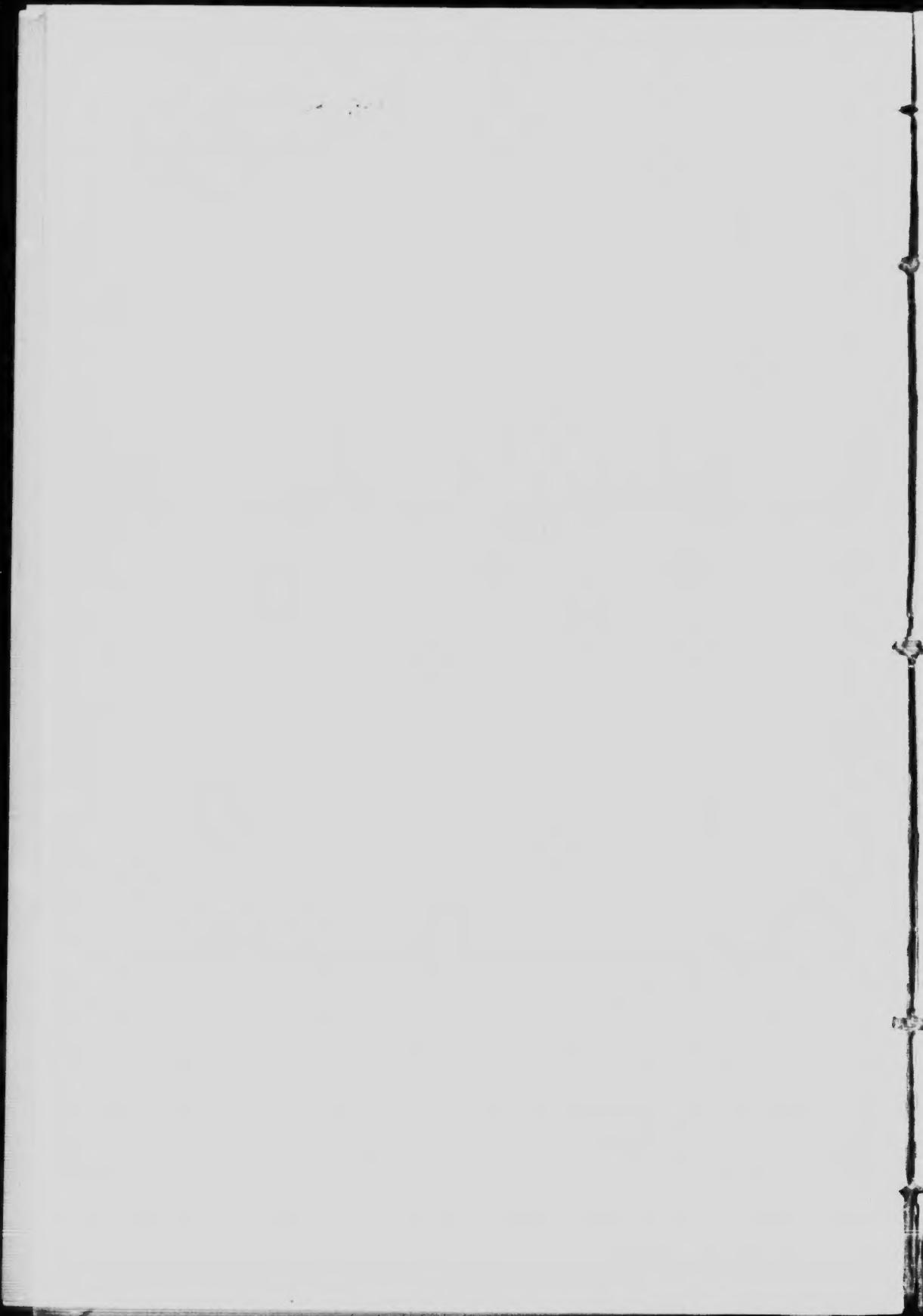
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# Manitoba Agricultural College

WINNIPEG, CANADA



Western Rye Grass in the cock at the Agricultural College

## Hay and Pasture Crops in Manitoba

T. J. HARRISON, B.S.A.

FIELD HUSBANDRY DEPARTMENT

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Published by authority of Hon. Valentine Winkler, Minister of Agriculture and Immigration

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Manitoba Agricultural College,  
Winnipeg, Canada.

June, 1915

To the HON. VALENTINE WINKLER,  
Minister of Agriculture and Immigration,  
Winnipeg, Manitoba.

Sir,—I beg to present herewith Bulletin No. 16  
of the Manitoba Agricultural College, entitled "Hay  
and Pasture Crops in Manitoba," by Prof. T. J. Har-  
rison, of the Field Husbandry Department.

This publication is being issued in response to  
numerous enquiries for information on this subject.  
I have no doubt that it will prove of great interest to  
farmers of this province.

Yours very truly,

W. J. BLACK,  
President.

## **Hay and Pasture Crops in Manitoba**

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In the early days in Manitoba little or no attention was given to the cultivation of hay and pasture crops. This was largely due to the fact that only a small amount of stock was kept on the average farm and the native meadows supplied all the hay and pasture required. As the country became more thickly settled these meadows were broken up and put under cultivation. It has, therefore, become necessary to seed down to cultivated grasses and clovers. Another reason for the increased interest in these crops is that the pernicious results from all wheat growing is becoming apparent. In the older districts it is now necessary to adopt methods of cultivation and crop rotation that will at least hold the weeds in check and return vegetable matter to the soil. The introduction of a grass crop into the rotation seems to be one of the most effective methods of accomplishing this.

### **PERENNIAL GRASSES**

There are a great number of cultivated grasses but there seems to be only five or six that are suited to Western conditions. Among these Western Rye, Timothy, Brome, English Blue and Red Top are the most common. No one of these can be recommended for the whole province or for all purposes. Of them all Western Rye and Timothy are probably better suited to a wider range of conditions and uses than any of the others.

### **WESTERN RYE GRASS**

Western Rye Grass is a native found on the prairies of Western Canada. The first record we have of it being grown under cultivation was in 1885 by Mr. K. McIvor, of Virden, Manitoba. It was later proven to be well adapted to cultivation by Mr. S. A. Bedford, Superintendent of the Brandon Experimental Farm. Since then it has been recognized as one of the best grasses in the West.

It is a tufted or bunch grass and is therefore better suited for the production of hay than pasture. When used for hay it gives a large yield per acre and if cut before it becomes too mature makes hay of first-class quality.



### Soil

Western Rye Grass can be grown on a great variety of soils, but it is found to thrive best on a moist sandy loam.

It will not stand excessive moisture as in the native meadows it was never found growing in the sloughs but around the edge where the water did not lie during the summer.

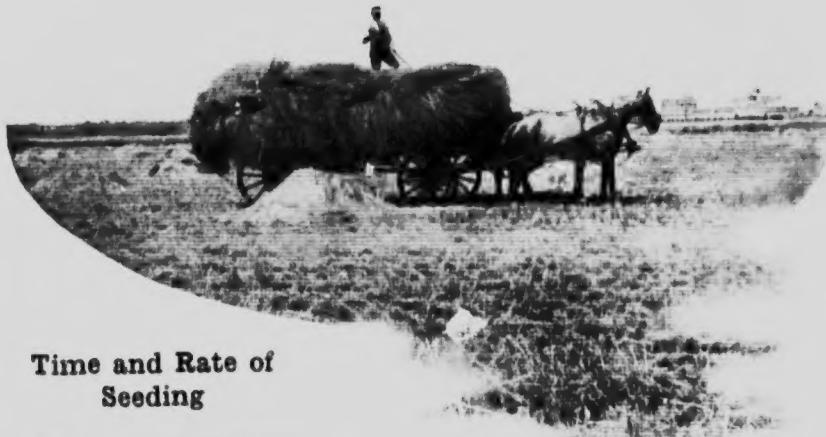
While it gives the largest yield on moist loams it is well adapted to the drier and heavier soils and can be grown successfully where Timothy and Red Clover are killed by drought.

### Place in Rotation

Western Rye is one of the easiest grass crops to work into the rotation. If the soil is badly exhausted it should only be sown on a summer fallow but if the soil is fertile and the season at all favorable good results can be obtained on stubble land. If sown on summer fallow a nurse crop can be used but if sown on stubble better results are obtained by seeding alone.

### Preparation of the Seed Bed

The seed of the Western Rye is comparatively small and does not contain a large amount of plant food and therefore, requires a fine seed bed so that the young plant can begin to draw on the soil for its food in its early stages of growth. The soil should be firm underneath with a granular mulch about an inch or an inch and a half deep on top. This allows the moisture to rise close to the surface and the mulch prevents evaporation. Spring plowing, if it is packed, harrowed, and seeded the same day as plowed will give fair results. A well worked summer-fallow is the ideal preparation; the surface is fine, the subsurface firm, and the soil is moist and free from weeds.



### Time and Rate of Seeding

The seed of Western Rye should be sown after the danger of frost is past and before the June rains

are over. In this province some time between the 15th of May and the 15th of June will give best results. The quantity of seed per acre will depend on the vitality of the seed and the preparation of the seed bed. If the vitality is up to standard and the seed bed well prepared about twelve pounds per acre will be found sufficient.

### Method of Seeding

The seed of the Western Rye is too large to be sown through a grass seeder attachment on the grain drill. It is sometimes mixed with the grain and sown in the drills. The objection to this is that if the grain is put down sufficiently deep the grass seed will be too deep and only a partial stand will be obtained.

Better results will be obtained by sowing broadcast and harrowing in. If a man has had experience and a calm day if selected good results will be obtained by sowing by hand. The most satisfactory method, however, is to distribute the seed by the use of a wheel-barrow seeder. The quantity per acre is regulated accurately and the seed is distributed evenly. The seed should then be harrowed until the soil is covered.

### Subsequent Treatment

If the seed is sown with a nurse crop it will require no further attention until the crop is harvested. Care should then be exercised not to leave the stocks too long on the field as the grass has a tendency to kill out under the stock. If it is sown without a nurse crop it may be necessary to run the mow over the land to clip off the weeds once or twice during the summer. If the land is clean a small cut of hay may be obtained in the fall.

### Harvesting the Crop the Subsequent Year

Western Rye is a very easy grass to cure. It should be cut before the stem becomes too woody which will usually be some time between the fifth and fifteenth of July. The hay can then be cured in the ordinary way.

### BROME GRASS

Brome grass comes to us from Russia and is, therefore, well adapted to the climatic conditions in the West. As it thrives well in dry districts, it is well suited to the southwestern portion of this province where the other grasses give poor results. It has a large root system which enables it to resist drought. This characteristic along with its large growth of basal leaves makes it the best pasture grass that can be grown. It starts early in the spring, grows fast in the fall and remains green during the dry weather in July and August.

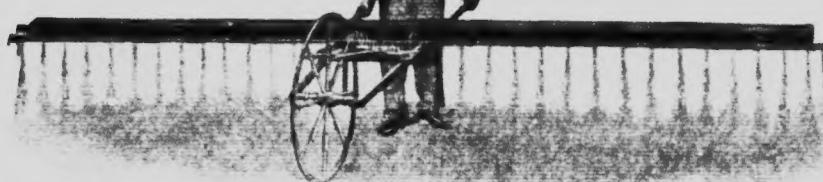
### Soil

While Brome will thrive on heavy, moist soils, it is not advisable to sow it in such situations unless for permanent pasture because it is usually a very persistent grower and difficulty will be experienced in eradicating it when the land is broken up. It prefers a sandy loam but will give excellent results on sandy soils. It is, also, the only grass that will thrive on alkali land.

### Place in Rotation

In districts where the soil is light and subject to drifting Brome should be included in every rotation. It fills the soil with fibrous roots binding it together and is found the only means of permanently preventing erosion by the wind. In case it should be introduced in a manner to Western Rye and other grasses in the rotation, it should be introduced in a similar manner to Western Rye and other grasses in the rotation. Where the rainfall is sufficient Brome should never be used in the rotation because of the difficulty in eradicating it.

In districts where this is the only grass in the rotation it should be introduced into the rotation in a similar manner to Western Rye and other grasses in the rotation. Timothy in the moister districts is the only grass that will grow well in the regular rotation because of its rapid growth and its ability to withstand the severe winter weather.



Wheelbarrow Seeder. Instead of pushing by hand, some farmers draw the machine behind a buggy or cart, attaching the handles to the axle of the rig.



though, in the In the more it can be used age in perman- provided they close to the breaks as in these districts it has a tendency to spread and will eventually kill out the trees.

**College Herd on good pasture**

drier districts, humid localities to good advantage at pastures, are not located hedges or wind-

### **Preparation of the Seed Bed**

If sown on summer-fallow Brome can be put down with a nurse crop but if sown on stubble land it is preferable to prepare the soil in June as for summer-fallow and sow the seed without a nurse crop. If the soil is subject to drifting a light top dressing of manure will prove beneficial. Another system that is followed to good advantage is to put in a light seeding of oats or barley which will grow and prevent drifting. These can be clipped off with the mower when the plants are five or six inches high.

### **Method of Seeding**

There is only one satisfactory method of sowing Brome and that is with a wheel-barrow seeder. It can be sown by hand but the seed is so light that an even stand is difficult to secure.

### **Time and Rate of Seeding**

It should be sown in the spring before the June rains are over at the rate of fourteen pounds per acre.

### **Treatment the First Year**

The stock should not be allowed to pasture on it until it has secured a good hold on the soil. It is preferable not to pasture the first season but if the season is favorable and there is a good growth of grass it will

not hurt it to pasture if it is not grazed too closely. If the weeds give trouble they can be clipped with the mower similar to Western Rye when sown without a nurse crop.

### **Subsequent Treatment**

If used for hay, Brome will give a fairly heavy crop the first year. After one year the sod becomes so dense or sod-bound that few seed stalks are sent up and it can only be used profitably for pasture. If the grower wishes to renew it without re-seeding it can be done by plowing it in June and packing it with a surface packer. The next year a good crop of hay can be cut. If the field is to be broken up and put in grain it should be plowed early in June and backset deep in August or September and then well cultivated before frost sets in. The system of plowing only once will not eradicate it but will stimulate it to better growth.

### **TIMOTHY**

Timothy makes hay that is recognized as the standard of excellence in both town and country. It usually sells on the market for about two or three dollars a ton more than the hay made from other grasses and is considered one of the best roughages for work horses on the farm. It is not as well adapted, however, to the conditions in Southwestern Manitoba as either the Western Rye or Brome. In districts where there is over twenty inches of rainfall it will give its best results.



Alfalfa, eight weeks after seeding, on College Farm

### Soil

Timothy can be grown on a great variety of soils but is found to thrive best on a moist clay loam with an open subsoil. It should never be sown alone on the lighter and drier soils but can be used to good advantage in a mixture.

### Place in Rotation

Where Timothy can be grown it is one of the easiest crops to work into the rotation. If the soil is rich a stand may be obtained by sowing with a nurse crop, but on the poorer soils better results are obtained by sowing alone.

### Preparation of the Seed Bed

The seed of the Timothy is very small and requires an extra fine seed-bed. A well worked summer-fallow is the ideal preparation.

### Selection of Seed

Like Western Rye and Brome there have up to the present been no varieties of Timothy isolated so that all there is to select from is the commercial seed. In selecting seed, therefore, the only points to be considered are purity and viability. The purity is very important because Timothy is one of the worst crops to introduce weed seeds. A large amount of the seed is imported and many new weeds are brought into the country in this way. The seeds are so small that they cannot



Sowing Alfalfa on corn land in Central Manitoba

be readily detected with the naked eye. When buying seed it will be wise to have it analyzed for impurities and tested for germination, or insist on getting No. 1 Government inspected seed.

### **Method of Seeding**

The best results are obtained by sowing the seed with a grass seed attachment on the grain drill. The seed in this way is scattered evenly on the surface and can be harrowed in to the right depth.

### **Time and Rate of Seeding**

In Manitoba the seed should be sown in the spring some time between the 15th of May and the 15th of June. The amount of seed will depend on the vitality of the seed and the preparation of the seed-bed. If the seed is viable and the soil firm and fine about eight pounds of seed will be sufficient. However, under average conditions nine or ten pounds will give better results.

### **Treatment First Year**

If the seed is sown with a nurse crop there is practically no care that can be given except to have the stools off the field as soon as possible in the fall. If sown without a nurse crop the mower should be run over the field during the summer to cut the weeds and if the season is very favorable a small cut of hay may be taken in the fall.

### **Subsequent Treatment**

The second year a crop of hay can be cut. The yield will depend on the fertility of the soil and the amount of rainfall. It is seldom profitable to leave Timothy down for more than two years.

### **ENGLISH BLUE GRASS—(Meadow Fescue)**

English Blue Grass has not been grown very extensively in the West. It, like Timothy, is better adapted to a moist climate. It is suitable for pasture purposes as it sends up few seed stalks and a large amount of basal leaves.

### **Place in Rotation**

English Blue Grass should be sown only where Bromé is objectionable. It has not the two objections that we have to the Bromé, namely, it is not a persistent grower and it does not spread into other fields.

### **Soil**

The English Blue Grass will thrive best on a moist loam soil.



Red Clover sown without nurse crop on College Farm

### **Preparation of the Seed Bed**

If best results are to be obtained the seed should be sown on a well worked summer-fallow. It will, however, give a fair stand on stubble land if the soil is fertile and the season favorable. The stubble should be plowed about four inches deep early in June, packed, harrowed and seeded the same day as plowed.

### **Method of Seeding**

As the seed is very similar to the Western Rye or Brome the wheel-barrow seeder will be found to give best results.

### **Time and Rate of Seeding**

It should be sown in the spring before the June rains are over at about fourteen or fifteen pounds per acre.

### **Treatment the First Year**

The stock should not be allowed to pasture on it the first season. If the weeds are troublesome they can be cut with a mower similar to Western Rye when sown without a nurse crop.

### **RED TOP**

Red Top is not extensively grown in the West. While it produces a fair quantity of hay it is not nearly so palatable as the other grasses. The only places where it can be grown to good advantage are the water runs and sloughs where it is covered with water for a period in the spring.

These places usually produce native grass but if mown or pastured continually they become infested with skunk grass and other unpalatable weeds, so that it becomes necessary to break them up and seed down with cultivated grasses. Red Top seems to be best adapted to this purpose.

### Preparation of the Soil

The land should be plowed as soon as it is dry enough to work which will usually be some time in July or August. Breaking should be done four or five inches deep because there is not time enough to let the sod rot and backset. A fine seed-bed may be worked up with the disc and drag harrows and the seed sown before the soil dries out. The seed should be sown without a nurse crop. As the seed is small best results are obtained by using a grass seeder attachment on the grain drill. As the soil is not usually in the best condition it is advisable to sow the seed thicker than would otherwise be necessary. About ten pounds to the acre will give the best results. The seed is very small and should not be covered too deeply, one stroke of the harrow usually being sufficient.

### CANADIAN AND KENTUCKY BLUE GRASS

Canadian and Kentucky Blue Grass are not suitable for field conditions in the West. They are shallow rooted and comparatively tender, therefore liable to winter killing. Their use in Manitoba is largely in lawn mixtures where they give a dense sward of fine leaves. As the lawns are usually more or less protected they come through the winter in good condition. The seed should be sown about twenty pounds per acre, preferably in a mixture of Canadian Blue, Kentucky Blue and White Dutch Clover.

### LEGUMES

The introduction of perennial grasses into the rotation will check the growth of weeds and return fibre to the land, but they will not return plant food to the exhausted soil. The Legumes are the only plants known that will accomplish this. The bacteria which work on the roots of these plants have the power of changing the nitrogen in the air into a form that can be used by the plant. There are many plants belonging to this order that can be successfully grown in Mani-



Mowing Rye on Old Agricultural College Farm

toba. The most important of the perennials and biennials are the Alfalfa, Red Clover, Alsike Clover, White Dutch Clover and Sweet Clover.

### ALFALFA

Alfalfa is one of the oldest plants in the world but has only recently been introduced into the Northwest. It has been known for some time in the Pacific states but was never, until recently, considered hardy enough for the severe winters of the Canadian West. Hardy varieties have been discovered, or originated, until at the present time we have strains that can be grown any place in Manitoba.

Alfalfa can be used for either hay or pasture crop. It makes a very valuable hay when cut at the right stage and well cured. Due to the large amount of protein or muscle making food it is exceptionally valuable for growing stock.

### Place in Rotation

Alfalfa should have a place in every rotation. While it has not been grown long enough in Manitoba to determine its fertilizing effect on the soil we know from the experience of farmers where it has been grown, that it adds considerable plant food to the land. A rotation including Alfalfa will, of necessity, be a long one as it does not come to its best until about the third or fourth year. The rotation that could be modified to suit the average mixed farmer is as follows:

- Field No. 1—Summerfallow.
- Field No. 2—Wheat.
- Field No. 3—Wheat.
- Field No. 4—Oats, seeded down with Western Rye Grass and Red Clover.
- Field No. 5—Hay.
- Field No. 6—Hay or pasture.
- Field No. 7—Alfalfa.



Sheep in Rape: a cheap and excellent pasture

This requires that the farm be divided into seven equal sized fields. At the end of six years time the rotation will have made one complete circle of the first six fields. The seventh field will, therefore, be six years in Alfalfa. At the end of that time the Alfalfa field is summer-fallowed and the regular summer-fallow seeded down with Alfalfa. This latter field will then in its

turn stay in Alfalfa for six years while the crops on the other fields make another complete circle. When the Alfalfa is not considered this gives a six-year rotation. Counting in the Alfalfa, however, the rotation becomes one of thirty-six years.

### Soil

The selection of the field for Alfalfa is very important. The location must be high and dry for if water will stand on it any time during the year the Alfalfa will kill out. The subsoil should be deep and open with a permanent water level at least four or five feet below the surface. This Legume has a long tap root which will go down to the water level but not into it and while most of the feeding roots are in the first eighteen inches it draws food from the lower depths and the lower the tap root the larger the feeding space. While Alfalfa will grow on practically any soil it will thrive best on a rich sandy loam that contains an appreciable amount of lime. The soil should be free from noxious weeds as this plant will not eradicate these pests.

### Preparation of the Soil

Alfalfa is very tender and is easily killed during the first year of growth so that the soil should be in a fine state of tilth before seeding. To get it in this condition preparation should start the year previous. Summer-fallowing or a hoed crop are the best preparations. The cultivation kills the weed and conserves the moisture. In the spring the soil should be disced and harrowed to work up a fine mulch on the surface leaving the subsoil firm. If the field is harrowed from time to time in the spring practically all of the annual weeds can be killed before the seed is sown.

### Selection of Seed

In selecting seed the variety should be considered first. There are three sorts that are giving good satisfaction in Manitoba, the Grimm, Baltic and Turkestan. The two former are the hardiest and give best results. Turkestan is a commercial term and the seed may be either hardy or tender, so that where the former two can be obtained, only they should be sown. They are, however, northern grown and the seed is scarce and consequently high priced. For this reason tender sorts are often sold by unscrupulous dealers for these hardy strains. It is difficult to distinguish between them so that seed should not be accepted unless it is guaranteed by a reliable firm.

Another thing to be on the watch for is noxious weed seeds. The Alfalfa is usually grown in the older districts to the south and is liable to contain seeds that are both noxious and new to the West.

To insure a good stand the seed should be tested for germination. If it does not test over 70 per cent a larger quantity of seed should be

sown. A safe guide to follow in purchasing this seed after the variety has been guaranteed by a reliable firm is to take only No. 1 Government inspected seed.

### Inoculation

Some of the failures in growing Alfalfa in this province are due to the fact that the soil or seed was not inoculated with nitrogen fixing bacteria. If these small organisms are not found in nodules on the roots of the plant only a poor stand will be obtained, because the average prairie soil does not contain sufficient nitrogen to produce a good growth of Alfalfa. These germs in the nodules have the power of converting the air nitrogen into a form that can be used by the plant. It is therefore necessary to have these present in the soil if success is to be insured. They are found in the soil in very few districts on the prairies. It is, therefore, necessary to introduce them in some form. This can be done in two ways, either by applying bacteria to the soil or to the seed. The former method is known as soil inoculation and consists of spreading, at the rate of 100 to 300 pounds per acre, the soil taken from a thrifty growing Alfalfa field on the land intended to be seeded down. To obtain the best results the soil should be spread as soon after digging as possible and preferably on a cloudy day, harrowing it in at once. The application can be made most easily at the time of planting the seed. This soil is supplied in one or two hundred pound lots by the Field Husbandry Department, Manitoba Agricultural College, Winnipeg, to applicants in Manitoba who remit sufficient to prepay the freight charges and cost of sack.

The seed inoculation consists in applying the bacteria that has been grown artificially by the bacteriologist to the seed. The Bacteriological Department, Manitoba Agricultural College, prepares this substance and send it out to the farmers at cost. This is a much easier method of inoculation than applying the soil. Both plans have given good satisfaction where care has been exercised. The latter has the advantage where a large acreage is to be sown and where there are no Alfalfa fields in the vicinity as the cost of shipping soil greatly increases the expense of getting a stand.

### Method of Seeding

Alfalfa should never be sown with a nurse crop. If the soil drifts a bushel or two of oats may be sown to prevent drifting and these clipped with the mower as soon as they form a cover for the ground.

The best results are obtained when the seed is sown with a grain drill setting the discs or shoes to run one inch deep. This allows the seed to be covered to a uniform depth so that it comes in contact with the moisture. To sow the seed by this method it should be mixed with twice its quantity of cracked wheat or barley from which all the fine flour has been blown with the fanning mill. If the seeder is set to sow from one half to three quarters bushels of wheat per acre it will put the

seed on approximately 10 or 12 pounds per acre which is sufficient for any place in Manitoba.

### Time of Planting

Alfalfa should not be sown earlier than the 15th of May so that it will miss the spring frosts and not later than the 15th of June so that it may get the June rains.

### Treatment First Year

The fields should be clipped with the mower when the Alfalfa and weeds are about 5 or 6 inches high and the clippings left on the ground to form a mulch. This kills the weeds and does not harm the Alfalfa. It is wise, however, to have the cutting bar of the mower set to cut high enough so that no injury to the crown of the plant may take place. The clipping should be repeated whenever the weeds again make their appearance. The last clipping should not be later than the 15th of August so that there may be considerable growth of top to hold the snow in winter. Stock must not be allowed to graze on the field for the first summer or winter.

### Subsequent Treatment

The second year the field will be ready for cropping. To get the best quality of hay the cutting should be done just when the plants start to blossom. This will usually be in the latter part of June or the first part of July. The second cutting will be about the first or second week in August. If the plants are to be insured against winter killing it should never be cut later than the 15th of August. While it is not advisable to pasture Alfalfa good results are sometimes reported especially if it has been standing for about three seasons. Even then the grazing should not be too close or too late in the fall. Care must be exercised in turning stock on this pasture as it has a tendency to bloat cattle and sheep.

If the weeds become troublesome a disc harrow or Alfalfa renovator can be run over the field stirring up the surface and killing the weeds.

### RED CLOVER

Red Clover is best adapted to a temperate climate. It requires more moisture than alfalfa and for this reason is not proving an unqualified success in the West. In most places in this province alfalfa will be decidedly superior. Another point that militates against it is the fact that it is really a biennial in habit, producing a good crop the first year and only a poor one the second and nothing at all the third. For this reason it is seldom sown alone but usually in a mixture with some of the grasses. Timothy is a favorite grass because where it will thrive Red Clover will grow.

### Place in Rotation

Where Red Clover can be grown it should have a place in the rotation. It is exceptionally well adapted to short rotations because of its biennial nature.

### Soil

Red Clover will grow on nearly all soils provided they are fertile. It will give its largest yields, however, on moist clay loam that contains an abundant supply of vegetable matter and lime. In new districts it is found to be better adapted to scrub land than the prairie soil.

### Preparation of the Seed Bed

If the seed bed is prepared similar to that outlined for alfalfa it will give good results with clover. It should be firm underneath, have a good supply of moisture and be level on top.

### Method of Seeding

Where Clover is sown alone it is not advisable to use a nurse crop and it can be sown similar to alfalfa. When sown in a mixture with timothy or other small grass seeds a nurse crop is sometimes used. Where this plan is adopted the seed may be sown with the grass seeder attachment.

### Time and Rate of Seeding

The seed should be sown about the time of oat seeding. The amount of seed per acre will vary according to the preparation of the soil and amount of rainfall. Under ordinary conditions from 8 to 10 pounds will be sufficient.

### Inoculation

On the prairie soils in Manitoba it is always advisable to inoculate either the soil or the seed before sowing Red Clover. Even if the bacteria are present in the soil better and quicker results are obtained by treating. For soil inoculation the same rules may be followed as were previously outlined for alfalfa only the soil must be taken from a Red Clover field. Nitro-culture for treating the seed is also prepared for Red Clover and may be secured from the Bacteriological Department, Manitoba Agricultural College.

### Treatment First Year

If no nurse crop is used clipping with a mower is necessary to control the weeds. The clippings should not be raked off but left to form a mulch. Stock and especially horses and sheep should not be allowed to graze on the field in fall as they are liable to injure the young plants.

### ALSIKE CLOVER

Alsike is somewhat similar in appearance to red clover but has a much finer and shorter stem and is therefore not as suitable for the production of hay. It is, however, perennial in habit which makes it better adapted to pasture meadows. Even when sown for pasture it is usually in a mixture in which some of the "cusses" predominate. Being indigenous to a cool wet climate it cannot be grown so successfully in the South and West.

#### Place in Rotation

As Alsike is a perennial it can be left down longer than red clover, otherwise, it will fill the same place in the rotation.

#### Soil

Alsike requires a moist soil, and while it may be grown on a sandy loam it will give best results on a clay loam that contains a large amount of lime. In no case, however, must it be sown on sour land as Alsike, like other legumes will not thrive in acid soils.

The preparation of seed bed and method of seeding will be similar to that outlined for red clover.

#### Inoculation

It is as necessary to inoculate for Alsike as for other legumes and it can be done similar to the method adopted for red clover and alfalfa, using Alsike nitro-culture or Alsike soil.

#### Time and Rate of Seeding

The seed should be sown about the time timothy and other grasses are sown. If alone it should be sown at the rate of six or seven pounds per acre.

### WHITE DUTCH CLOVER

White Dutch Clover is a very hardy, small, creeping plant. It is sometimes sown in pasture meadows but it is not very suitable even for pasture. Due to its acrid flavor none of the farm stock are fond of it. The place for the White Dutch Clover is on the lawn or in the bee pasture.

### SWEET CLOVER

The White Sweet Clover will grow any place in Manitoba. In some districts it grows wild along the roads and in waste lots and is considered a weed. Considerable controversy has arisen in regard to

its value as a fodder plant. Many of our better authorities claim that it is useless as such and should be considered only as a weed. It is, however, a good gatherer of nitrogen and can be used to good advantage as a green manure. It is a biennial in habit so that it can be sown with a nurse crop and plowed down the second year working the land as a summer-fallow.

### GRASS AND CLOVER MIXTURES

To obtain larger yields per acre and better balanced fodder it is sometimes advisable to sow grasses and clovers in mixtures. The following mixtures might be used to good advantage:

For hay in the dry districts:	For hay in the wet districts:
Alfalfa, 8 pounds	1½ to 2 pounds
Western Rye, 8 pounds	Western Rye, 4 pounds
	½ to 1 pound
For hay in the moister districts:	For hay in the moister districts:
Western Rye, 8 pounds	Field or Blue Grass, 8 pounds
Red Clover, 6 pounds	Red Clover, 6 pounds
Timothy, 4 pounds	Timothy, 4 pounds

### ANNUAL HAY AND PASTURE CROPS

In the average year and under normal conditions most of the hay and pasture will be produced on the grass and clover meadows. It frequently happens, however, that through winter grazing or some other cause the stand of grass is injured, or the number of live stock may be greatly increased, so that it becomes necessary to supplement the permanent meadows with some annual crop. There are a number of crops that can be used for this purpose in Manitoba. Among the more common are fodder corn, oats and peas, winter rye, rye grass, the malts.

### CORN

On every farm where live stock is being kept at least five acres of Corn should be grown. It furnishes the cheapest succulent feed that can be produced and at the same time leaves the soil in ideal condition for a crop of wheat. Information in regard to its culture may be obtained from the Field Husbandry Department, Manitoba Agricultural College.

### OATS AND PEAS

A mixture of Oats and Peas can be used to good advantage either for winter roughage or pasture. Oats have been used extensively in the West for the production of oat hay and have proven to be one of the cheapest and easiest forage crops to handle that can be grown on the farm. Without greatly increasing the cost, the quality can be improved considerably by adding a legume, such as Peas.

### Mixture

In making up a mixture of the Oats and Peas it is necessary to have two varieties that will mature in about the same time. Banner Oats and Golden Vine Peas make a good combination. They should be sown at the rate of two bushels of Oats and one bushel of Peas. This allows for the maximum amount of Peas than can be harvested with the grain binder.

### Preparation of Soil

While this crop will give best results on summer-fallow, it is not good practice to sow it on land prepared in this manner since fair yields can be obtained on spring plowing. The soil should be packed, harrowed and seeded as soon after plowing as possible to prevent the soil drying out, the best results will be obtained if it is done the same day as plowed.

### Date of Seeding

When grown for fodder the seed should be sown some time between the 15th of May and the 15th of June. This will be late enough to escape the spring frosts and will be early enough to obtain the June rains. If it is to be used for pasture the seeding should be done on a succeeding date to give continuous pasture throughout the season. The following dates have given good satisfaction: May 15th, May 30th, June 15th, June 30th and July 15th.

### Harvesting

The proper time to harvest Oats and Peas to obtain the highest quality of fodder is when the top portion of the Oat panicle is turning yellow. The cheapest and easiest method of harvesting is with the grain binder. The sheaves must be made small and only about six put in a stack so that they may cure without spoiling. After it has become thoroughly dried it can be either stacked outside or put in the mow. Oats and Peas may be used as a substitute for corn in districts where corn cannot be grown and the product preserved in the silo. Where used in this manner they should be cut at about the same stage of maturity as for cured fodder and put in the silo as soon as cut. Extra tramping in the silo is necessary to exclude the air from the hollow stems. Where this precaution is taken the ensilage will remain sweet and give nearly as good results as that made from corn.

### WINTER RYE

Winter Rye has proven to be hardy in Manitoba and where late fall and early spring pasture is desired it will be found to give good satisfaction. Because of its ability to remain green after being frozen it affords a large amount of pasture from the last week in September until freeze-up. Under normal weather conditions it will live over winter and renew its growth the following spring providing good grazing before the grasses start into growth.

### Soil

Winter Rye is better adapted to poor, worn out soils, than any other cereal, and it, therefore, often sown on the poorest land and produces fair pasture. While this is true, it will respond readily to good soil and cultivation. Moist clay or sandy loam gives the best results.

### Preparation of Seed Bed

Since Winter Rye can be used to good advantage in the eradication of wild oats it is usually sown on the most weedy field. Where this is practiced the best method is to work the land as summer-fallow until September and then seed. The summer cultivation puts the soil in ideal condition to produce a good crop. Fair crops may be obtained by sowing on fall plowed stubble land, but the difficulty is to get the crop off in time to sow the rye.

### Time and Rate of Seeding

For fall pasture the seed should be sown about the last week in August or the first week in September. About one and a half to two bushels of seed per acre is required. The seed should be sown with the grain drill depositing the seed between two and three inches below the surface of the soil. If sown shallower, there is danger of the stock injuring it to such an extent that it will be likely to winter kill.

### Pasturing

The field is usually ready for pasture about the last week in September or the first week in October. If it is to be used as Spring pasture care should be exercised not to graze it too closely in the Fall. If this precaution is taken it can be pastured in the Spring shortly after the frost is out of the first six inches of soil. If it makes good growth while being pastured and the stock are taken off as soon as the perennial pastures are ready, a small crop of grain may be harvested. This will usually be ready to harvest about the last week in July.

### RAPE

Among the annual forage crops there is none that will produce a cheaper or better pasture than Rape. It can be sown on land intended for summer-fallow and will produce good pasture and leave the soil in nearly as good condition for wheat as does the bare fallow.

### Soil

Rape will grow on almost all kinds of soil. It thrives best, however, on soil that contains a large amount of humus or vegetable matter.

### Preparation of Seed Bed

It often happens that a field which has been sown to grass winter kills and has to be broken up. If this is plowed in June about four inches deep and well cultivated with the disc and drag harrow and the

seed sown before the soil dries out it will produce a good crop of Rape. When sown as a substitute for the bare fallow the land should be plowed before the 30th of June about six inches deep and the seed sown immediately.

### Time of Seeding

The seed can be sown any time between May 1st and June 30th. Under average conditions the crop should be ready for pasture in about five weeks after seeding.

### Method of Seeding

Rape may be either sown broadcast or in drills. If the soil is free of weeds and moist, broadcasting will give good results, but if the land is weedy or dry better results will be obtained by planting in rows about thirty inches apart and intertilling similar to corn. There is also less waste of feed when planted in rows as the animals usually walk between the rows and therefore do not trample as many plants. It will require two to four pounds of seed sown in drills and four to six pounds broadcasted.

### Pasturing

To obtain the best results it should be pastured before it becomes too mature. If the stock are allowed on the field when it is about twelve or fifteen inches high it will be found to be more palatable than if it is allowed to grow to eighteen to twenty inches high. With cattle and sheep care should be taken to prevent bloating. They should never be allowed into a Rape pasture when they are hungry or when there is dew on the plants.

## MILLETS

Among the annual forage crops Millets have always had a prominent place. They are usually grown as catch crops or for the purpose of supplementing the usual supply of hay. There are a large number of different varieties, but in the West the varieties most commonly grown for hay production are the Common and Hungarian (often called Hungarian Grass)

### Soil

While the Millets can be grown on the poorer soils, they thrive best on a rich, black loam.

### Preparation of the Soil

Since they are used chiefly as a catch crop they are usually sown on spring plowing. If planted on stubble land the plowing should be done about four inches deep and the seed sown after the land has been well cultivated with the drag harrow and packer. When sod land is used it should be plowed at least four inches deep and a fine seed bed prepared with the disc and drag harrow.

### Time of Seeding

The seed should not be sown until the soil is warm. In Manitoba the best results will be obtained between June 15th and July 15th.

### Rate of Seeding

The rate of seeding will depend somewhat on the method of sowing. If sown broadcast, about twenty-five or thirty pounds of seed per acre will be required. It would seem, however, that better results are obtained where sown with the ordinary grain drill, putting on about fifteen or twenty pounds. By allowing the discs or shoes to run about one and a half inches deep it will place the seed down to the moisture and cause a complete germination. To sow the seed in this manner it should be mixed with about twice its quantity of cracked wheat or barley and the drill set to seed slightly over three pecks of wheat per acre.

### Curing Fodder

The Millets are usually cut with the mower and the hay allowed to cure in the swath. As it has a large leaf growth and comparatively thick stems, it will take longer to cure than the perennial grasses, but after it is thoroughly dried it can be stacked or put in the mow similar to other hay.

### Feeding

Where live stock, especially horses, are fed exclusively on Millet hay, it will be found to affect the kidneys, causing the animal to go lame. This will not be so noticeable if the hay is cut before the seed has formed. When harvested in this manner and fed in moderation or in conjunction with some other roughage it will be found to be a nutritious food for horses, cattle and sheep.



Cutting Common Millet, 1914, on College Farm

# MANITOBA AGRICULTURAL COLLEGE

(EXTENSION SERVICE)

Any of the following Bulletins or Circulars may be obtained free on request from the Extension Department.

## BULLETINS

- 1—Horses.
- 2—Twelve Noxious Weeds.
- 3—Care of Milk and Cream.
- 4—Protection of Farm Buildings from Lightning.
- 5—The Farm Garden.
- 6—Farm Poultry in Manitoba.
- 7—Hog Raising in Manitoba.
- 8—Cow Testing.
- 9—Repairing Farm Equipment and Roads.
- 10—Plans for Farm Buildings.
- 11—Canning and Preserving.
- 12—The Farm Flock.
- 13—Barn Ventilation.
- 14—Care of Cream for Creameries.
- 15—Boys' and Girls' Clubs.
- 16—Hay and Pasture Crops in Manitoba.
- 17—Silo Construction and Ensilage Production
- 18—Bee-Keeping in Manitoba.
- 20—College Extension Service.

## CIRCULARS

- 1—The Farmers' Beef Ring.
- 2—Some Facts About Sheep.
- 3—Manitoba's Hog Market.
- 4—Beef Cattle Situation.
- 5—A Few Dairy Facts.
- 6—A Plea For Bird Houses.
- 7—Our Friends, the Birds.
- 8—Hints on Home Nursing.
- 9—Practical Hints on Poultry.
- 10—Meat and Its Substitutes.
- 11—What Every Girl Should Know.
- 12—Poison Ivy and Other Poisonous Plants
- 13—Cream for Creameries.
- 14—Method in Dressmaking.
- 15—Fattening Chickens for Market.
- 16—Pork Making on the Farm.
- 17—Servants in the House.
- 18—Alfalfa in Manitoba.
- 19—Fodder Corn in Manitoba.
- 20—Alfalfa Inoculation.
- 21—Barley Growing.
- 22—Notes on Growing Trees, Shrubs etc.
- 23—Improving the Farm Egg.
- 24—Growing Plums in Manitoba.
- 25—Growing Cherries in Manitoba.
- 26—Control of Insect Pests.
- 27—Pruning Trees for a Cold Climate.
- 28—Spray Mixtures.
- 29—Tree Pests and Cutworms.